

## 9. Quality of Service

### Introduction

This section summarizes various kinds of service quality data filed by the regional Bell Companies and Sprint (incumbent local exchange carriers) for calendar year 2003. The data track the quality of service provided to both retail customers (business and residential) and access customers (interexchange carriers).

The Federal Communications Commission (FCC or Commission) does not impose service quality standards on communications common carriers. Rather, the Commission annually monitors quality of service data submitted by major incumbent local operating companies that collectively serve about 90% of the incumbents' access lines. The Commission summarizes these data and periodically publishes a report on quality of service trends.<sup>1</sup> The tables included in this report present comparative data on key company performance indicators. These include objective indicators of installation and maintenance performance, switch outages and trunk blocking performance. The tables also present data on customer perceptions of service, as well as the level of consumer complaints.

### Background

At the end of 1983, anticipating AT&T's imminent divestiture of its local operating companies, the Commission directed the Common Carrier Bureau<sup>2</sup> to establish a monitoring program that would provide a basis for detecting adverse trends in network service quality. Subsequently, the Bureau modified the service quality reporting requirements to reduce unnecessary paperwork and to ensure that needed information would be provided in a uniform format. Initially, the data were received twice yearly. The data collected for 1989 and 1990 formed the basis for FCC summary reports published in June 1990 and July 1991, respectively, highlighting five basic elements of quality of service data collected at that time.

With the implementation of price-cap regulation for certain local exchange carriers, the Commission made several major changes to the service quality monitoring program beginning with

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1 The last report on service quality was released in February 2004, which covered data for 2002. See Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, *Quality of Service of the Local Operating Companies* (February, 2004). This report can be found on the Commission's FCC-State Link website at [www.fcc.gov/wcb/iatd/stats.html](http://www.fcc.gov/wcb/iatd/stats.html) under the category Telephone Industry Infrastructure and Service Quality.

2 As the result of a reorganization in March 2002, the Wireline Competition Bureau now performs Common Carrier Bureau functions described in this report. In this report, references to the Common Carrier Bureau apply to activities prior to the above date.

reports filed in 1991. First, the Commission expanded the class of companies filing reports to include non-Bell carriers that have elected to be subject to price-cap regulation.<sup>3</sup> These carriers are also known as non-mandatory price-cap carriers and most of them are much smaller. Second, it included service quality reports in the Automated Reporting Management Information System (ARMIS).<sup>4</sup> Finally, the Commission ordered significant changes to the kinds of data these carriers had to report.<sup>5</sup> Following these developments, the Commission released service quality summary reports in February 1993, March 1994, March 1996, September 1998, December 1999, December 2001, January 2003, and February 2004 focusing on the largest companies.<sup>6</sup>

In 1996, pursuant to requirements in the Telecommunications Act of 1996,<sup>7</sup> the Commission reduced the frequency of data reporting for all reports to annual submissions.<sup>8</sup> In May 1997,

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3 *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786, 6827-31 (1990) (*LEC Price Cap Order*) (establishing the current service quality monitoring program and incorporating the service quality reports into the ARMIS program), Erratum, 5 FCC Rcd 7664 (1990), *modified on recon.*, 6 FCC Rcd 2637 (1991), *aff'd sub nom.*, *Nat'l Rural Telecom Ass'n v. FCC*, 988 F.2d 174 (D.C. Cir. 1993). The incumbent local exchange carriers that are rate-of-return regulated are not subject to federal service quality reporting requirements.

4 *LEC Price Cap Order*, 5 FCC Rcd at 6827-30. The ARMIS database includes a variety of mechanized company financial and infrastructure reports in addition to the quality-of-service reports. Most data are available disaggregated to a study area level which generally represents operations within a given state.

5 *Id.*; *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 6 FCC Rcd 2974 (1991) (*Service Quality Order*), *recon.*, 6 FCC Rcd 7482 (1991). Previously the Common Carrier Bureau had collected data on five basic service quality measurements from the Bell Operating Companies. These were customer satisfaction levels, dial tone delay, transmission quality, on time service orders, and percentage of call blocking due to equipment failure.

6 The reports have included data from the mandatory price cap companies and the largest non-mandatory carriers, GTE and Sprint. GTE is now a part of Verizon, a mandatory price cap carrier. Non-mandatory carriers are not required to file customer satisfaction data that appears in the ARMIS 43-06 report.

7 *Telecommunications Act of 1996*, Pub. L. No. 104-104, 110 Stat. 56.

8 Orders implementing filing frequency and other reporting requirement changes associated with implementation of the Telecommunications Act of 1996 are as follows: *Implementation of the Telecommunications Act of 1996: Reform of Filing Requirements and Carrier Classifications*, CC Docket No. 96-193, Order and Notice of Proposed Rulemaking, 11 FCC Rcd 11716 (1996); *Revision of ARMIS Quarterly Report (FCC*

relevant definitions were clarified further. These changes have been reflected starting with data covering the 1997 calendar year. The raw data are now filed annually in April of each year.

### The Data

The data presented in this section summarize the ARMIS 43-05 and 43-06 carrier reports and include early data revisions if they are submitted in time for inclusion herein.<sup>9</sup> Tables in this section include data from the regional Bell companies, Sprint, and other smaller price-cap companies.<sup>10</sup> This year we have added a set of tables for smaller non-mandatory price cap companies. The companies report quality of service data that have been aggregated to a study area level which generally represent operations within a given state. Tables 9.1(a), 9.2(a), 9.3(a), 9.4 and 9.5 cover data for the Bell operating companies or mandatory price cap companies and Tables 9.1(b), 9.2(b) and 9.3(b) cover data for smaller non-mandatory price-cap companies. The resulting data in the tables represent the aggregate of all study areas for each listed entity. Reporting companies also provide a fairly extensive amount of raw data about individual switching outages, including outage durations and number of lines affected.

The company-level quality of service data presented in the tables are derived by calculating sums or weighted averages of data reported at the study area level. In particular, where companies report study area information in terms of percentages or average time intervals, this section presents company composites that are calculated by weighting the percentage or time interval figures from all study areas within that company. For example, we weight the percent of commitments met by the

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*Report 43-01) et al.*, CC Docket No. 96-193, Order, 11 FCC Rcd 22508 (1996); *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, AAD No. 95-91, Order, 12 FCC Rcd 21831 (1997).

- 9 Source data used in preparing this report may be useful for further investigation and can be readily extracted from the ARMIS 43-05 and 43-06 tables on the online database maintained on the FCC website at [www.fcc.gov/wcb/eafs](http://www.fcc.gov/wcb/eafs). The data are also available from Best Copy and Printing, Inc. at (202) 488-5300. A number of prior-year data summary reports are available through the FCC's Reference Information Center (Courtyard Level) at 445 12th Street, SW, Washington, D.C. 20554.
- 10 In February 1992, United Telecommunications Inc. became Sprint Corporation (Local Division); and in March 1993, Sprint Corporation acquired Centel Corporation. Bell Atlantic and NYNEX merged in August 1997, and then merged with GTE in 2000. Verizon Communications is shown separately for GTE, Verizon North (the former NYNEX companies), and Verizon South (the former Bell Atlantic Companies). SBC, Pacific Telesis and Ameritech are shown separately despite the merger of SBC and Pacific Telesis in April 1997 and SBC and Ameritech in October 1999.

corresponding number of orders provided in the filed data.<sup>11</sup>

In the case of outage data summarized in Tables 9.2 and 9.3, we calculate a number of useful statistics from raw data records for individual switches with outages lasting more than 2 minutes. These statistics include the total number of events lasting more than 2 minutes, average outage duration, average number of outages per hundred switches, average number of outages per million access lines, and average outage line-minutes per thousand access lines and per event. Outage line-minutes is a measure that combines both duration and number of lines affected in a single parameter. We derive this parameter from the raw data by multiplying the number of lines involved in each outage by the duration of the outage and summing the resulting values. We then divide the resulting sum by the total number of thousands of access lines or of events to obtain average outage line-minutes per access line and average outage line minutes per event respectively.

The tables contained in this section cover data for 2003. Table 9.1 provides installation, maintenance and customer complaint data. The installation and maintenance data are presented separately for local services provided to end users and access services provided to interexchange carriers. Table 9.2 shows switch downtime and trunk servicing data. Table 9.3 shows outage data by cause. Tables 9.4 and 9.5 present data filed only by mandatory price-cap companies (Bell Operating Companies) in the ARMIS 43-06 report. The statistics presented in Tables 9.4 and 9.5 are straightforward and contain percentages and sample sizes in approximately the same format it was filed. Table 9.4 contains the percentages of residential, small business and large business customers indicating dissatisfaction with Bell Operating Company (BOC) installations, repairs and business offices, as determined by BOC customer perception surveys. Table 9.5 shows the underlying survey sample sizes.

This section displays data elements that have remained roughly comparable over the past few years. Such data are useful in identifying and assessing trends. More detailed information on the raw data from which this section has been developed may be found on the Commission's ARMIS web page cited in footnote 9. Complete data descriptions are available in several Commission orders.<sup>12</sup>

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11 Although companies have prepared their own company composites, we have recalculated a number of them from study area data to assure that company averages are calculated in a consistent manner. We weight data involving percentages or time intervals in order to arrive at consistent composite data shown in the tables. Parameters used for weighting in this report were appropriate for the composite being calculated and were based on the raw data filed by the carriers but are not necessarily shown in the tables. For example, we calculate composite installation interval data by summing the individual study area results multiplied by the number of installation orders reported for each study area and then dividing the result by the total number of orders.

12 *See supra* note 8.

**Table 9.1 (a)**  
**Installation, Maintenance, & Customer Complaints**  
**Bell Companies - 2003**

|  | BellSouth | Qwest | SBC<br>Ameritech | SBC<br>Pacific | SBC<br>Southwestern | SBC<br>SNET | Verizon<br>North | Verizon<br>South | Verizon<br>GTE |
|--|-----------|-------|------------------|----------------|---------------------|-------------|------------------|------------------|----------------|
| <b>ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SWITCHED ACCESS</b> |           |       |                  |                |                     |             |                  |                  |                |
| Percent Installation Commitments Met   | 100.0     | 99.6  | 77.5             | 96.9           | 89.5                | 40.8        | 98.3             | 98.5             | 95.0           |
| Average Installation Interval (days)   | 18.2      | 15.8  | 43.6             | 34.3           | 27.2                | NA          | 26.8             | 23.5             | 25.7           |
| Average Repair Interval (hours)  | 0.5       | 1.5   | 6.5              | 17.9           | 5.2                 | 0.7         | 3.9              | 6.3              | 10.5           |
| <b>ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SPECIAL ACCESS</b>  |           |       |                  |                |                     |             |                  |                  |                |
| Percent Installation Commitments Met   | 99.8      | 98.4  | 96.0             | 99.1           | 98.3                | 95.2        | 88.1             | 89.7             | 92.4           |
| Average Installation Interval (days)   | 12.0      | 9.2   | 17.4             | 17.2           | 17.0                | 17.5        | 23.9             | 17.8             | 19.6           |
| Average Repair Interval (hours)  | 3.2       | 2.8   | 4.3              | 3.5            | 3.1                 | 3.6         | 8.0              | 4.4              | 18.2           |
| <b>LOCAL SERVICES PROVIDED TO RESIDENTIAL AND BUSINESS CUSTOMERS</b>         |           |       |                  |                |                     |             |                  |                  |                |
| Percent Installation Commitments Met   | 97.3      | 99.6  | 98.9             | 99.5           | 99.0                | 99.5        | 98.5             | 98.7             | 98.6           |
| Residence  | 98.3      | 99.7  | 98.9             | 99.6           | 99.1                | 99.5        | 98.6             | 98.8             | 98.8           |
| Business   | 90.1      | 98.8  | 98.2             | 99.2           | 98.3                | 98.9        | 97.5             | 97.1             | 96.0           |
| Average Installation Interval (days)   | 1.4       | 0.4   | 1.5              | 1.7            | 2.0                 | 1.3         | 1.1              | 1.5              | 0.5            |
| Residence  | 1.1       | 0.4   | 1.5              | 1.5            | 1.9                 | 1.0         | 1.0              | 1.4              | 0.5            |
| Business   | 1.8       | 1.2   | 1.7              | 3.3            | 2.4                 | 3.3         | 2.3              | 2.3              | 1.9            |
| Average Out of Service Repair Interval (hours)                               | 19.7      | 14.6  | 16.4             | 23.6           | 20.9                | 26.6        | 32.6             | 31.1             | 18.4           |
| Residence  | 21.5      | 14.7  | 16.9             | 25.8           | 22.1                | 26.7        | 34.8             | 33.9             | 19.9           |
| Business   | 10.6      | 13.8  | 14.1             | 13.0           | 14.4                | 26.1        | 23.7             | 16.0             | 11.2           |
| Initial Trouble Reports per Thousand Lines                                   | 278.5     | 113.4 | 149.7            | 119.4          | 175.4               | 180.3       | 194.1            | 157.9            | 153.1          |
| Total MSA  | 269.3     | 112.8 | 147.7            | 115.8          | 160.7               | 177.7       | 197.4            | 155.0            | 146.7          |
| Total Non MSA  | 334.0     | 115.8 | 173.9            | 231.9          | 253.5               | 232.5       | 171.5            | 190.8            | 176.4          |
| Total Residence  | 320.4     | 134.7 | 212.6            | 166.3          | 274.8               | 228.2       | 289.1            | 226.8            | 176.0          |
| Total Business   | 168.1     | 65.0  | 59.6             | 47.9           | 58.3                | 77.0        | 81.9             | 61.5             | 99.5           |
| Troubles Found per Thousand Lines  | 166.8     | 86.5  | 106.7            | 100.9          | 133.2               | 96.0        | 138.0            | 117.0            | 127.3          |
| Repeat Troubles as a Pct. of Trouble Reports                                 | 19.0%     | 19.5% | 16.6%            | 10.4%          | 13.5%               | 17.5%       | 22.2%            | 20.4%            | 13.7%          |
| Res. Complaints per Mill. Res. Access Lines                                  | 205.2     | 147.7 | 22.6             | 18.9           | 24.4                | 113.2       | 166.7            | 563.7            | 113.8          |
| Bus. Complaints per Mill. Bus. Access Lines                                  | 58.1      | 59.4  | 3.9              | 2.4            | 4.9                 | 61.0        | 28.1             | 50.5             | 44.4           |

NA: Not available

Please refer to text for notes and data qualifications

**Table 9.1 (b)**  
**Installation, Maintenance, & Customer Complaints**  
**Other Companies - 2003**

|  | Alltel | CenturyTel | Cincinnati<br>Bell | Citizens | Citizens<br>Frontier | Iowa<br>Telecom | Sprint | Valor |
|--|--------|------------|--------------------|----------|----------------------|-----------------|--------|-------|
| <b>ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SWITCHED ACCESS</b> |        |            |                    |          |                      |                 |        |       |
| Percent Installation Commitments Met   | 89.8   | 89.0       | 100.0              | 93.0     | 92.6                 | 66.2            | 91.5   | 94.0  |
| Average Installation Interval (days)   | 15.3   | 13.8       | 15.3               | 30.0     | 9.3                  | 14.8            | 10.9   | 25.7  |
| Average Repair Interval (hours)  | 4.9    | 25.8       | NA                 | NA       | 2.8                  | 11.3            | 2.9    | NA    |
| <b>ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SPECIAL ACCESS</b>  |        |            |                    |          |                      |                 |        |       |
| Percent Installation Commitments Met   | 90.4   | 85.3       | 100.0              | 89.7     | 77.5                 | 63.9            | 95.5   | 98.2  |
| Average Installation Interval (days)   | 11.8   | 13.8       | 13.9               | 17.7     | 20.5                 | 13.8            | 10.1   | 15.6  |
| Average Repair Interval (hours)  | 4.6    | 12.3       | 2.7                | 21.0     | 24.0                 | 11.4            | 4.5    | 3.4   |
| <b>LOCAL SERVICES PROVIDED TO RESIDENTIAL AND BUSINESS CUSTOMERS</b>         |        |            |                    |          |                      |                 |        |       |
| Percent Installation Commitments Met   | 97.4   | 98.4       | 99.9               | 96.5     | 76.7                 | 98.8            | 97.1   | 97.7  |
| Residence  | 97.7   | 98.3       | 99.9               | 96.7     | 77.6                 | 98.7            | 97.5   | 97.7  |
| Business   | 95.2   | 75.9       | 99.8               | 95.8     | 71.1                 | 98.0            | 94.2   | 97.7  |
| Average Installation Interval (days)   | 1.9    | 3.6        | 2.1                | 5.5      | 4.8                  | 1.9             | 1.6    | 2.0   |
| Residence  | 1.9    | 3.3        | 4.5                | 5.2      | 5.0                  | 1.8             | 1.4    | 2.0   |
| Business   | 2.7    | 4.6        | 1.8                | 7.6      | 3.8                  | 2.7             | 2.7    | 2.0   |
| Average Out of Service Repair Interval (hours)                               | 24.8   | 15.3       | 58.1               | 16.1     | 28.0                 | 9.8             | 17.1   | 16.4  |
| Residence  | 25.9   | 15.7       | 37.6               | 16.3     | 28.1                 | 10.1            | 17.3   | 16.9  |
| Business   | 16.9   | 13.8       | 20.1               | 14.3     | 27.7                 | 7.6             | 15.7   | 13.3  |
| Initial Trouble Reports per Thousand Lines                                   | 233.5  | 131.4      | 114.6              | 275.7    | 266.6                | 129.4           | 192.2  | 368.0 |
| Total MSA  | 227.1  | 121.5      | 114.6              | NA       | 279.1                | 129.8           | 172.7  | 291.9 |
| Total Non MSA  | 240.2  | 140.0      | NA                 | 275.7    | 252.0                | 129.3           | 230.7  | 434.1 |
| Total Residence  | 294.3  | 147.5      | 143.3              | 313.6    | 300.8                | 146.4           | 231.7  | 433.6 |
| Total Business   | 92.2   | 80.8       | 47.3               | 155.8    | 185.8                | 70.1            | 87.7   | 182.5 |
| Troubles Found per Thousand Lines  | 180.7  | 107.6      | 104.1              | 230.8    | 218.2                | 114.9           | 127.3  | 348.1 |
| Repeat Troubles as a Pct. of Trouble Reports                                 | 22.5%  | 22.7%      | 16.1%              | 15.2%    | 13.2%                | 16.7%           | 20.5%  | 11.9% |
| Res. Complaints per Mill. Res. Access Lines                                  | 326.4  | 746.6      | 383.3              | 537.5    | 184.7                | 25.1            | 110.0  | 271.3 |
| Bus. Complaints per Mill. Bus. Access Lines                                  | 62.9   | 324.7      | 110.5              | 141.9    | 100.6                | 0.0             | 47.9   | 173.5 |

NA: Not available

Please refer to text for notes and data qualifications

**Table 9.2 (a)**  
**Switch Downtime & Trunk Blocking**  
**Bell Companies - 2003**

|   | BellSouth | Qwest  | SBC<br>Ameritech | SBC<br>Pacific | SBC<br>Southwestern | SBC<br>SNET | Verizon<br>North | Verizon<br>South | Verizon<br>GTE |
|---|-----------|--------|------------------|----------------|---------------------|-------------|------------------|------------------|----------------|
| Total Access Lines in Thousands                     | 22,206    | 14,277 | 18,309           | 16,693         | 14,670              | 2,173       | 16,557           | 20,432           | 16,366         |
| Total Trunk Groups                                  | 3,361     | 3,206  | 1,003            | 1,263          | 741                 | NA          | 788              | 891              | 1,566          |
| Total Switches                                      | 1,629     | 1,322  | 1,439            | 779            | 1,658               | 161         | 1,292            | 1,336            | 3,146          |
| Switches with Downtime                              |           |        |                  |                |                     |             |                  |                  |                |
| Number of Switches                                  | 40        | 147    | 25               | 26             | 65                  | 1           | 63               | 53               | 86             |
| As a Percentage of Total Switches                   | 2.5%      | 11.1%  | 1.7%             | 3.3%           | 3.9%                | 0.6%        | 4.9%             | 4.0%             | 2.7%           |
| Average Switch Downtime in Seconds per Switch       |           |        |                  |                |                     |             |                  |                  |                |
| For All Events                                      | 24.0      | 69.4   | 3.4              | 0.3            | 52.8                | 7.5         | 244.3            | 26.1             | 396.8          |
| For Unscheduled Events Over 2 Minutes               | 23.0      | 60.8   | 2.6              | 0.0            | 51.7                | 7.5         | 210.4            | 25.3             | 396.5          |
| For Unscheduled Downtime More Than 2 Minutes        |           |        |                  |                |                     |             |                  |                  |                |
| Number of Occurrences or Events                     | 23        | 23     | 11               | 0              | 18                  | 1           | 24               | 13               | 96             |
| Events per Hundred Switches                         | 1.4       | 1.7    | 0.8              | 0.0            | 1.1                 | 0.6         | 1.9              | 1.0              | 3.1            |
| Events per Million Access Lines                     | 1.04      | 1.61   | 0.60             | 0.00           | 1.23                | 0.46        | 1.45             | 0.64             | 5.87           |
| Average Outage Duration in Minutes                  | 27.2      | 58.2   | 5.8              | NA             | 79.3                | 20.0        | 188.8            | 43.3             | 216.6          |
| Average Lines Affected per Event in Thousands       | 15.9      | 13.3   | 21.5             | NA             | 24.1                | 25.7        | 25.9             | 27.8             | 2.9            |
| Outage Line-Minutes per Event in Thousands          | 326.7     | 303.1  | 117.8            | NA             | 475.7               | 513.0       | 5,044.0          | 812.0            | 289.1          |
| Outage Line-Minutes per 1,000 Access Lines          | 338.4     | 488.3  | 70.7             | 0.0            | 583.7               | 236.1       | 7,311.7          | 516.7            | 1,696.0        |
| For Scheduled Downtime More Than 2 Minutes          |           |        |                  |                |                     |             |                  |                  |                |
| Number of Occurrences or Events                     | 0         | 18     | 2                | 0              | 1                   | 0           | 3                | 0                | 2              |
| Events per Hundred Switches                         | 0.0       | 1.4    | 0.1              | 0.0            | 0.1                 | 0.0         | 0.2              | 0.0              | 0.1            |
| Events per Million Access Lines                     | 0.00      | 1.26   | 0.11             | 0.00           | 0.07                | 0.00        | 0.18             | 0.00             | 0.12           |
| Average Outage Duration in Minutes                  | NA        | 5.1    | 6.5              | NA             | 4.7                 | 0.0         | 11.3             | 0.0              | 5.5            |
| Avg. Lines Affected per Event in Thousands          | NA        | 8.7    | 4.7              | NA             | 82.3                | 0.0         | 14.7             | 0.0              | 7.2            |
| Outage Line-Minutes per Event in Thousands          | NA        | 33.8   | 30.0             | NA             | 386.9               | 0.0         | 100.3            | 0.0              | 39.3           |
| Outage Line-Minutes per 1,000 Access Lines          | 0.0       | 42.6   | 3.3              | 0.0            | 26.4                | 0.0         | 18.2             | 0.0              | 4.8            |
| % Common Trunk Grps. Exceeding Blocking Objectives: | 2.41%     | 1.90%  | 0.00%            | 0.40%          | 0.54%               | NA          | 0.76%            | 1.91%            | 0.32%          |

NA: Not available

Please refer to text for notes and data qualifications

**Table 9.2 (b)**  
**Switch Downtime & Trunk Blocking**  
**Other Companies - 2003**

|  | Alltel   | CenturyTel | Cincinnati<br>Bell | Citizens | Citizens<br>Frontier | Iowa<br>Telecom | Sprint  | Valor    |
|--|----------|------------|--------------------|----------|----------------------|-----------------|---------|----------|
| Total Access Lines in Thousands                    | 793      | 626        | 968                | 1,379    | 971                  | 257             | 7,776   | 529      |
| Total Trunk Groups                                 | 108      | 232        | 99                 | 262      | 273                  | 109             | 570     | 213      |
| Total Switches                                     | 243      | 187        | 85                 | 207      | 185                  | 273             | 1,331   | 292      |
| Switches with Downtime                             |          |            |                    |          |                      |                 |         |          |
| Number of Switches                                 | 22       | 3          | 20                 | 8        | 44                   | 24              | 47      | 26       |
| As a Percentage of Total Switches                  | 9.1%     | 1.6%       | 23.5%              | 3.9%     | 23.8%                | 8.8%            | 3.5%    | 8.9%     |
| Average Switch Downtime in Seconds per Switch      |          |            |                    |          |                      |                 |         |          |
| For All Events                                     | 2,830.8  | 357.8      | 279.2              | 137.4    | 1,009.1              | 411.8           | 211.7   | 1,150.3  |
| For Unscheduled Events Over 2 Minutes              | 2,830.8  | 357.8      | 0.0                | 115.9    | 964.9                | 411.8           | 181.4   | 1,150.3  |
| For Unscheduled Downtime More Than 2 Minutes       |          |            |                    |          |                      |                 |         |          |
| Number of Occurrences or Events                    | 29       | 3          | 0                  | 4        | 22                   | 24              | 33      | 33       |
| Events per Hundred Switches                        | 11.9     | 1.6        | 0.0                | 1.9      | 11.9                 | 8.8             | 2.5     | 11.3     |
| Events per Million Access Lines                    | 36.57    | 4.79       | 0.00               | 2.90     | 22.67                | 93.51           | 4.24    | 62.38    |
| Average Outage Duration in Minutes                 | 395.3    | 371.7      | NA                 | 100.0    | 135.2                | 78.1            | 121.9   | 169.6    |
| Average Lines Affected per Event in Thousands      | 3.6      | 6.4        | NA                 | 4.6      | 5.1                  | 0.5             | 8.0     | 1.8      |
| Outage Line-Minutes per Event in Thousands         | 862.7    | 3,450.4    | NA                 | 545.1    | 2,961.9              | 27.4            | 1,564.6 | 240.5    |
| Outage Line-Minutes per 1,000 Access Lines         | 31,553.1 | 16,525.2   | 0.0                | 1,581.4  | 67,142.1             | 2,558.8         | 6,640.0 | 15,000.3 |
| For Scheduled Downtime More Than 2 Minutes         |          |            |                    |          |                      |                 |         |          |
| Number of Occurrences or Events                    | 0        | 0          | 0                  | 4        | 3                    | 0               | 12      | 0        |
| Events per Hundred Switches                        | 0.0      | 0.0        | 0.0                | 1.9      | 1.6                  | 0.0             | 0.9     | 0.0      |
| Events per Million Access Lines                    | 0.00     | 0.00       | 0.00               | 2.90     | 3.09                 | 0.00            | 1.54    | 0.00     |
| Average Outage Duration in Minutes                 | NA       | NA         | NA                 | 18.5     | 40.0                 | NA              | 23.9    | NA       |
| Avg. Lines Affected per Event in Thousands         | NA       | NA         | NA                 | 3.1      | 1.5                  | NA              | 17.5    | NA       |
| Outage Line-Minutes per Event in Thousands         | NA       | NA         | NA                 | 48.8     | 55.4                 | NA              | 125.1   | NA       |
| Outage Line-Minutes per 1,000 Access Lines         | 0.0      | 0.0        | 0.0                | 141.6    | 171.2                | 0.0             | 193.0   | 0.0      |
| % Common Trunk Grps. Exceeding Blocking Objectives | 0.00%    | 0.00%      | 18.18%             | 0.00%    | 0.00%                | 0.00%           | 0.17%   | 0.10%    |

NA: Not available

Please refer to text for notes and data qualifications



**Table 9.3 (a)**  
**Switch Downtime Causes**  
**Bell Companies - 2003**

|  | BellSouth | Qwest | SBC<br>Ameritech | SBC<br>Pacific | SBC<br>Southwestern | SBC<br>SNET | Verizon<br>North | Verizon<br>South | Verizon<br>GTE |
|--|-----------|-------|------------------|----------------|---------------------|-------------|------------------|------------------|----------------|
| <b>Total Number of Outages</b>                             |           |       |                  |                |                     |             |                  |                  |                |
| 1. Scheduled   | 0         | 18    | 2                | 0              | 1                   | 0           | 3                | 0                | 2              |
| 2. Procedural Errors -- Telco. (Inst./Maint.)              | 0         | 0     | 0                | 0              | 1                   | NA          | 1                | 1                | 8              |
| 3. Procedural Errors -- Telco. (Other)                     | 6         | 1     | 0                | 0              | 2                   | 0           | 0                | 0                | 0              |
| 4. Procedural Errors -- System Vendors                     | 2         | 1     | 2                | 0              | 2                   | 0           | 0                | 0                | 4              |
| 5. Procedural Errors -- Other Vendors                      | 0         | 1     | 0                | 0              | 1                   | 0           | 0                | 2                | 1              |
| 6. Software Design   | 2         | 2     | 4                | 0              | 3                   | 0           | 2                | 5                | 5              |
| 7. Hardware Design   | 3         | 0     | 3                | 0              | 0                   | 0           | 0                | 0                | 0              |
| 8. Hardware Failure  | 7         | 13    | 1                | 0              | 9                   | 1           | 11               | 2                | 37             |
| 9. Natural Causes  | 0         | 0     | 0                | 0              | 0                   | 0           | 1                | 2                | 9              |
| 10. Traffic Overload                                       | 0         | 0     | 0                | 0              | 0                   | 0           | 0                | 0                | 0              |
| 11. Environmental  | 0         | 0     | 1                | 0              | 0                   | 0           | 2                | 0                | 3              |
| 12. External Power Failure                                 | 2         | 4     | 0                | 0              | 0                   | 0           | 7                | 1                | 26             |
| 13. Massive Line Outage                                    | 0         | 0     | 0                | 0              | 0                   | 0           | 0                | 0                | 1              |
| 14. Remote   | 0         | 1     | 0                | 0              | 0                   | 0           | 0                | 0                | 2              |
| 15. Other/Unknown  | 1         | 0     | 0                | 0              | 0                   | 0           | 0                | 0                | 0              |
| <b>Total Outage Line-Minutes per Thousand Access Lines</b> |           |       |                  |                |                     |             |                  |                  |                |
| 1. Scheduled   | 0.0       | 42.6  | 3.3              | 0.0            | 26.4                | 0.0         | 18.2             | 0.0              | 4.8            |
| 2. Procedural Errors -- Telco. (Inst./Maint.)              | 0.0       | 0.0   | 0.0              | 0.0            | 44.8                | 0.0         | 6.0              | 110.3            | 60.2           |
| 3. Procedural Errors -- Telco. (Other)                     | 68.7      | 10.2  | 0.0              | 0.0            | 41.2                | 0.0         | 0.0              | 0.0              | 0.0            |
| 4. Procedural Errors -- System Vendors                     | 18.5      | 21.3  | 27.0             | 0.0            | 14.4                | 0.0         | 0.0              | 0.0              | 37.9           |
| 5. Procedural Errors -- Other Vendors                      | 0.0       | 45.6  | 0.0              | 0.0            | 29.8                | 0.0         | 0.0              | 70.9             | 59.1           |
| 6. Software Design   | 6.9       | 14.2  | 20.2             | 0.0            | 74.1                | 0.0         | 621.1            | 33.6             | 132.9          |
| 7. Hardware Design   | 3.1       | 0.0   | 20.2             | 0.0            | 0.0                 | 0.0         | 0.0              | 0.0              | 0.0            |
| 8. Hardware Failure  | 50.6      | 273.6 | 1.3              | 0.0            | 379.5               | 236.1       | 557.3            | 29.1             | 462.1          |
| 9. Natural Causes  | 0.0       | 0.0   | 0.0              | 0.0            | 0.0                 | 0.0         | 0.6              | 256.8            | 646.6          |
| 10. Traffic Overload                                       | 0.0       | 0.0   | 0.0              | 0.0            | 0.0                 | 0.0         | 0.0              | 0.0              | 0.0            |
| 11. Environmental  | 0.0       | 0.0   | 6.7              | 0.0            | 0.0                 | 0.0         | 93.8             | 0.0              | 32.5           |
| 12. External Power Failure                                 | 188.8     | 122.8 | 0.0              | 0.0            | 0.0                 | 0.0         | 6,032.9          | 15.8             | 229.0          |
| 13. Massive Line Outage                                    | 0.0       | 0.0   | 0.0              | 0.0            | 0.0                 | 0.0         | 0.0              | 0.0              | 1.9            |
| 14. Remote   | 0.0       | 0.5   | 0.0              | 0.0            | 0.0                 | 0.0         | 0.0              | 0.0              | 34.0           |
| 15. Other/Unknown  | 1.8       | 0.0   | 0.0              | 0.0            | 0.0                 | 0.0         | 0.0              | 0.0              | 0.0            |

NA: Not available

Please refer to text for notes and data qualifications

**Table 9.3 (b)**  
**Switch Downtime Causes**  
**Other Companies - 2003**

|  | Alltel   | CenturyTel | Cincinnati<br>Bell | Citizens | Citizens<br>Frontier | Iowa<br>Telecom | Sprint  | Valor    |
|--|----------|------------|--------------------|----------|----------------------|-----------------|---------|----------|
| <b>Total Number of Outages</b>                             |          |            |                    |          |                      |                 |         |          |
| 1. Scheduled   | 0        | 0          | 0                  | 4        | 3                    | 0               | 12      | 0        |
| 2. Procedural Errors -- Telco. (Inst./Maint.)              | 4        | 0          | 0                  | 0        | 0                    | 4               | 11      | 7        |
| 3. Procedural Errors -- Telco. (Other)                     | 2        | 3          | 0                  | 0        | 0                    | 0               | 1       | 0        |
| 4. Procedural Errors -- System Vendors                     | 0        | 0          | 0                  | 0        | 0                    | 0               | 0       | 20       |
| 5. Procedural Errors -- Other Vendors                      | 0        | 0          | 0                  | 1        | 1                    | 0               | 0       | 1        |
| 6. Software Design   | 1        | 0          | 0                  | 1        | 0                    | 1               | 1       | 0        |
| 7. Hardware Design   | 0        | 0          | 0                  | 0        | 0                    | 0               | 0       | 0        |
| 8. Hardware Failure  | 11       | 0          | 0                  | 0        | 8                    | 16              | 4       | 0        |
| 9. Natural Causes  | 7        | 0          | 0                  | 1        | 2                    | 1               | 3       | 1        |
| 10. Traffic Overload                                       | 0        | 0          | 0                  | 0        | 0                    | 0               | 0       | 2        |
| 11. Environmental  | 0        | 0          | 0                  | 0        | 0                    | 0               | 0       | 0        |
| 12. External Power Failure                                 | 0        | 0          | 0                  | 1        | 5                    | 0               | 4       | 2        |
| 13. Massive Line Outage                                    | 1        | 0          | 0                  | 0        | 5                    | 2               | 2       | 0        |
| 14. Remote   | 1        | 0          | 0                  | 0        | 1                    | 0               | 3       | 0        |
| 15. Other/Unknown  | 2        | 0          | 0                  | 0        | 0                    | 0               | 4       | 0        |
| <b>Total Outage Line-Minutes per Thousand Access Lines</b> |          |            |                    |          |                      |                 |         |          |
| 1. Scheduled   | 0.0      | 0.0        | 0.0                | 141.6    | 171.2                | 0.0             | 193.0   | 0.0      |
| 2. Procedural Errors -- Telco. (Inst./Maint.)              | 6,048.8  | 0.0        | 0.0                | 0.0      | 0.0                  | 168.4           | 3,580.0 | 2,837.4  |
| 3. Procedural Errors -- Telco. (Other)                     | 1,222.2  | 16,525.2   | 0.0                | 0.0      | 0.0                  | 0.0             | 0.2     | 0.0      |
| 4. Procedural Errors -- System Vendors                     | 0.0      | 0.0        | 0.0                | 0.0      | 0.0                  | 0.0             | 0.0     | 10,583.3 |
| 5. Procedural Errors -- Other Vendors                      | 0.0      | 0.0        | 0.0                | 854.8    | 9.8                  | 0.0             | 0.0     | 428.6    |
| 6. Software Design   | 784.5    | 0.0        | 0.0                | 69.2     | 0.0                  | 92.3            | 9.4     | 0.0      |
| 7. Hardware Design   | 0.0      | 0.0        | 0.0                | 0.0      | 0.0                  | 0.0             | 0.0     | 0.0      |
| 8. Hardware Failure  | 7,012.8  | 0.0        | 0.0                | 0.0      | 398.4                | 1,553.6         | 28.9    | 0.0      |
| 9. Natural Causes  | 13,160.8 | 0.0        | 0.0                | 44.7     | 469.9                | 92.1            | 2,332.1 | 54.1     |
| 10. Traffic Overload                                       | 0.0      | 0.0        | 0.0                | 0.0      | 0.0                  | 0.0             | 0.0     | 971.1    |
| 11. Environmental  | 0.0      | 0.0        | 0.0                | 0.0      | 0.0                  | 0.0             | 0.0     | 0.0      |
| 12. External Power Failure                                 | 0.0      | 0.0        | 0.0                | 612.7    | 66,021.2             | 0.0             | 360.8   | 125.8    |
| 13. Massive Line Outage                                    | 11.3     | 0.0        | 0.0                | 0.0      | 189.9                | 652.5           | 145.4   | 0.0      |
| 14. Remote   | 3,034.2  | 0.0        | 0.0                | 0.0      | 52.9                 | 0.0             | 46.0    | 0.0      |
| 15. Other/Unknown  | 278.6    | 0.0        | 0.0                | 0.0      | 0.0                  | 0.0             | 137.3   | 0.0      |

NA: Not available

Please refer to text for notes and data qualifications

**Table 9.4**  
**Customer Perception Surveys - Percent of Customers Dissatisfied**  
**Bell Companies - 2003**

|                         | BellSouth | Qwest | SBC<br>Ameritech | SBC<br>Pacific | SBC<br>Southwestern | SBC<br>SNET | Verizon<br>North | Verizon<br>South | Verizon<br>GTE |
|-------------------------|-----------|-------|------------------|----------------|---------------------|-------------|------------------|------------------|----------------|
| <b>Installations:</b>   |           |       |                  |                |                     |             |                  |                  |                |
| Residential             | 6.71      | 5.49  | 8.09             | 6.07           | 7.88                | 7.56        | 6.40             | 5.79             | 4.21           |
| Small Business          | 8.94      | 10.94 | 12.33            | 7.43           | 9.12                | 7.64        | 10.97            | 10.24            | 7.81           |
| Large Business          | 6.80      | NA    | 9.42             | 6.49           | 7.81                | NA          | 2.63             | 1.84             | 2.30           |
| <b>Repairs:</b>         |           |       |                  |                |                     |             |                  |                  |                |
| Residential             | 10.08     | 6.45  | 11.45            | 7.59           | 9.93                | 11.91       | 21.95            | 20.39            | 12.69          |
| Small Business          | 8.24      | 8.33  | 11.62            | 6.36           | 6.58                | 9.25        | 15.97            | 10.43            | 9.38           |
| Large Business          | 6.62      | NA    | 8.91             | 5.07           | 5.97                | NA          | 5.85             | 1.55             | 2.25           |
| <b>Business Office:</b> |           |       |                  |                |                     |             |                  |                  |                |
| Residential             | 8.68      | 1.78  | 9.62             | 5.49           | 9.10                | 7.75        | 7.47             | 7.25             | 6.90           |
| Small Business          | 14.52     | 3.93  | 10.04            | 6.83           | 7.05                | 9.75        | 8.25             | 8.36             | 8.58           |
| Large Business          | 8.92      | NA    | 5.69             | 3.61           | 5.06                | NA          | 6.09             | 4.45             | 9.73           |

NA: Not available

Please refer to text for notes and data qualifications

**Table 9.5**  
**Customer Perception Surveys - Sample Sizes**  
**Bell Companies - 2003**

|                         | BellSouth | Qwest  | SBC<br>Ameritech | SBC<br>Pacific | SBC<br>Southwestern | SBC<br>SNET | Verizon<br>North | Verizon<br>South | Verizon<br>GTE |
|-------------------------|-----------|--------|------------------|----------------|---------------------|-------------|------------------|------------------|----------------|
| <b>Installations:</b>   |           |        |                  |                |                     |             |                  |                  |                |
| Residential             | 37,912    | 20,755 | 10,626           | 10,657         | 10,794              | 4,667       | 20,189           | 17,420           | 23,290         |
| Small Business          | 41,930    | 8,345  | 10,455           | 10,851         | 10,601              | 2,370       | 18,939           | 17,342           | 21,747         |
| Large Business          | 9,969     | NA     | 4,052            | 3,313          | 2,797               | NA          | 807              | 954              | 564            |
| <b>Repairs:</b>         |           |        |                  |                |                     |             |                  |                  |                |
| Residential             | 30,546    | 11,863 | 10,695           | 12,524         | 10,792              | 2,393       | 20,195           | 17,438           | 21,976         |
| Small Business          | 45,120    | 7,125  | 10,644           | 11,226         | 10,733              | 1,199       | 20,075           | 17,268           | 21,938         |
| Large Business          | 7,829     | NA     | 4,134            | 3,513          | 2,829               | NA          | 710              | 824              | 489            |
| <b>Business Office:</b> |           |        |                  |                |                     |             |                  |                  |                |
| Residential             | 42,183    | 20,511 | 21,212           | 23,811         | 23,997              | 2,982       | 10,434           | 10,713           | 14,950         |
| Small Business          | 11,744    | 8,228  | 20,294           | 23,530         | 17,476              | 1,005       | 3,794            | 4,460            | 4,779          |
| Large Business          | 482       | NA     | 4,570            | 2,232          | 3,521               | NA          | 613              | 738              | 401            |

NA: Not available

Please refer to text for notes and data qualifications